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THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN. MANUAL FOR CODING MOTHER-CHILD INTERACTION ON THE EIGHT-BLOCK SORTING TASK.

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THIS MANUAL DESCRIBES MEASURES USED IN "THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN" PROJECT AT THE UNIVERSITY OF CHICAGO. THE SAMPLE FOR THE STUDY CONSISTED OF 163 NEGRO MOTHER-CHILD PAIRS SELECTED FROM 3 SOCIOECONOMIC CLASSES BASED ON THE FATHER'S OCCUPATION AND THE PARENTS' EDUCATION. A FOURTH GROUP INCLUDED FATHER-ABSENT FAMILIES. THE MOTHERS WERE INTERVIEWED AT HOME AND THE MOTHERS AND CHILDREN WERE TESTED AT THE UNIVERSITY OF CHICAGO WHEN THE CHILDREN WERE 4 YEARS OLD. FOLLOW-UP DATA WERE OBTAINED WHEN THE CHILDREN WERE 6 AND AGAIN WHEN THEY WERE 7. THE MOTHER-CHILD INTERACTION OBSERVED IN THE 8-BLOCK SORTING TASK (PS 000 487) WAS ANALYZED ACCORDING TO 2 SCHEMES. THE FIRST SCHEME DIVIDES THE INTERACTION INTO MESSAGE UNITS, AND THE SECOND SCHEME CONCENTRATES ON QUALITATIVE ASPECTS OF BEHAVIOR. THE MESSAGE UNITS WERE CATEGORIZED AND CODED ACCORDING TO SUCH SCHEMA AS VERBAL MESSAGE TYPE, PHYSICAL MESSAGE TYPE, AND FEEDBACK FROM CHILD. FROM THESE MESSAGE UNITS, 15 MATERNAL AND 16 CHILD MEASURES WERE CALCULATED. THE BEHAVIORAL ANALYSIS WAS USED TO CALCULATE 13 MATERNAL AND 2 CHILD MEASURES. PRINCIPAL COMPONENT FACTOR ANALYSIS OF THESE MEASURES FOUND 6 MATERNAL AND 4 CHILD FACTORS. THE FACTORS FOR THE MOTHER WERE DESIGNATED (1) REWARD-ORIENTED MOTIVATION TECHNIQUES, (2) PUNISHMENT-ORIENTED MOTIVATION TECHNIQUES, (3) ORIENTATION, (4) SPECIFICITY IN PRERESPONSE INSTRUCTIONS, (5) SPECIFICITY IN POSTRESPONSE FEEDBACK, AND (6) GENERAL SATURATION OF TASK-SPECIFIC INFORMATION. THOSE FOR THE CHILD WERE LABELED (7) RESISTANCE, (8) BLOCK PLACEMENT ERRORS, (9) VERBALIZATION OF LABELS, AND (10) VERBAL PARTICIPATION. FACTOR SCORES WERE BASED ON UNROTATED, NONORTHOGANAL FACTORS SO THAT SOME CORRELATIONS ARE PRESENT. THE COMPLETE SET OF PROJECT MANUALS COMPRISES PS 000 475 THROUGH PS 000 492. (DR)

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THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN

Robert D. Hess, Principal Investigator

MANUAL FOR CODING MOTHER-CHILD INTERACTION ON THE EIGHT-BLOCK SORTING TASK

PS 000488

The measures described in this manual were developed in the project, Cognitive Environments of Urban Pre-School Children, supported by: Research Grant #R-34 from the Children's Bureau, Social Security Administration, and the Early Education Research Center, National Laboratory in Early Education, Office of Education, both of the U.S. Department of Health, Education, and Welfare; the Division of Research, Project Head Start, U.S. Office of Economic Opportunity; the Ford Foundation Fund for the Advancement of Learning; and grants-in-aid from the Social Science Research Committee of the Division of Social Sciences, University of Chicago.

THE COGNITIVE ENVIRONMENTS OF URBAN PRE-SCHOOL CHILDREN

The research sample for the Cognitive Environment Study was composed of 163 pairs of Negro mothers and their four-year-old children, from three socioeconomic classes, defined by father's occupation and parents' education: upper-middle, professional and executive, with college education; upper lower, skilled and blue collar, with high school education; lower-lower, semiskilled and unskilled, with no greater than tenth-grade education; a fourth group included father-absent families living on public assistance, otherwise identical to the lower-lower class group.

Subjects were interviewed in the home, and mothers and children were brought to the University of Chicago campus for testing, when the children were four years old. Follow-up data were obtained from both mother and child when the child was six years of age, and again at seven years.

Principal Investigator for the project is Professor Robert D. Hess, formerly Director, Urban Child Center, University of Chicago, now Lee Jacks Professor of Child Education, School of Education, Stanford University.

Co-Investigator for the follow-up study is Dr. Virginia C. Shipman, Research Associate (Associate Professor) and Lecturer, Committee on Human Development, and Director, Project Head Start Evaluation and Research Center, University of Chicago, who served as Project Director for the pre-school phase of the research.

Dr. Jere Edward Brophy, Research Associate (Assistant Professor), Committee on Human Development, University of Chicago, was Project Director for the follow-up study and participated as a member of the research staff of the pre-school study.

Dr. Roberta Meyer Bear, Research Associate (Assistant Professor), Committee on Human Development, University of Chicago, participated as a member of the research staff during the pre-school and follow-up phases of the project and was in charge of the manuscript preparation during the write-up phase of the research.

Other staff members who contributed substantively to the project include Dr. Ellis Olim (University of Massachusetts, Amherst), who was responsible for the major analysis of maternal language; Dr. David Jackson (Toronto, Ontario), who was involved in early stages of development of categories for the analysis of mother-child interaction, and participated in the processing and analysis of data; Mrs. Dorothy Runner, who supervised the training and work of the home interviewers, acted as a liason with public agencies, and had primary responsibility for obtaining the sample of subjects; and Mrs. Susan Beal, computer programmer.

COGNITIVE ENVIRONMENT STUDY

MANUAL FOR CODING

MOTHER-CHILD INTERACTION

ON THE EIGHT-BLOCK SORTING TASK*

SUMMER 1967

INTRODUCTION

The block sorting task provides a rich source of data for the study of mother-child interaction, and consequently it has been intensively analysed in the Cognitive Environment Study. This manual includes the coding procedures from two independent coding analyses. The first, developed by Dr. J. David Jackson, divides the entire interaction into small message units (basically clauses) which are coded into several categories reflecting the type and content of the messages. The second, based on the dissertation of Dr. Jere Brophy, concentrates on selected aspects of the subjects' behavior and makes qualitative distinctions which could not be derived from the previous system. The two systems are complementary, each providing information not available from the other. All the information (measures) from both systems is ultimately used in a single analysis of the block sorting task, without distinction as to coding system. However, to simplify the presentation of the coding procedures, the two systems and the measures derived from them will be described separately in this manual. Following this, the subsequent use of the combined group of measures will be described.

* We wish to acknowledge the work of Nancy Vogeler, Alan Fiske, and Gregory Kavka, who did much of the initial coding and who contributed many valuable suggestions for improving the coding procedures.

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COGNITIVE ENVIRONMENT STUDY

CODING MANUAL FOR THE BLOCK SORTING TASK

CODING PROCEDURES FROM MESSAGE UNIT ANALYSIS

SUMMARY OF CODING CATEGORIES

Verbal Messages	Columns 1 and 2	13
	00 No verbal message	14
Informing or motivating	01 Task informing	14
	02 Engaging	14
	03 Orienting	15
	04 Command - physical	15
Feedback request	05 Command - verbal	15
	06 Question - physical	15
	07 Question - verbal	16
	08 Affirmative reply to feedback	16
	09 Negative reply to feedback	17
Feedback reply	10 Informing - reply	17
	11 Control	17
	12 Incomplete or interrupted sentence	17
	13 Focus or verbal point	18
	14 Non-task communication	18
	15 Unintelligible	19
Physical Messages	Column 3	19
	00 No message	19
	01 Point	20

02 Physical restriction 20

03 Demonstration 20

Feedback Given — Columns 4 and 5 21

01 Neutral 21

02 Negative task involvement 21

03 Verbal affirmative 22

04 Verbal intermediate 22

05 Verbal negative 23

06 Physical action - correct 23

07 Physical action - intermediate 24

08 Physical action - incorrect 24

09 Requests task-specific information 24

10 Responds to non-task-oriented message 24

11 Volunteers unsolicited task-specific information 24

12 Verbal indefinite - positive task involvement 25

13 Unintelligible 25

Attention to Mother — Column 6 25

01 Full attention 26

02 Part attention 26

03 No attention - tune out 27

Discriminations — Column 7 27

00 No discriminations 29

01 Metron 30

	02 Two metrons on the same logon	30
	03 Bonding	30
	04 One logon	30
	05 Two logons	30
	06 One metron requiring the child to select two or more blocks	30
	07 One logon repeated	31
	08 Repeated bonding	31
	09 Global	31
Number of Mother's Words	Columns 8 and 9	32
Number of Child's Words	Columns 10 and 11	32
	PRACTICE CASE	33
	DESIGN OF THE CODING SHEETS	36

CODING FORMS

Coding should be done directly on the scoring sheets. Each message must be scored for all columns on the sheet. Care must be taken to note that messages are not always initiated by the mother; therefore, there may be a zero in the first three columns.

The numbers on the coding sheet refer to the columns on an IBM card. Each message unit will be punched on a separate card. Either one or two columns may refer to one category. These columns are called the 'field' corresponding to that category. For example, the field of the first category, Verbal Messages, is two columns wide and the second field is one column, etc. If the rating in a two column field is a unit number (01, 04, 09), it must be entered in the low order or right-hand column. It is not necessary to enter a zero in the high order column.

The right-hand columns are used for identification of the time intervals, message number and case number. Each time interval is indicated by a series of asterisks (***) in the transcription. The time intervals vary for different cases. During the early mother-child interactions, the intervals were one minute; in later interactions, 30 second intervals were marked. A message which overlaps two time intervals is always rated as part of the former interval. The message numbers can simply be filled in on the sheets before beginning the coding. The field for the case number is three columns wide. The last three columns are used for the deck codes. Each new sample and each task will be identified by a distinctive deck number.

If a message unit is missed and does not have a number, give it the number of the preceding message unit, and insert it in the correct place, coded

as usual, adding an A in column 72.

A sample interaction and a description of the design of the coding sheets are found on pages 33 - 36.

For the purposes of this manual, coding consists of three processes.

1) Unitizing, which means breaking up the interaction into message units.

2) Rating, which refers to assigning a code to each aspect of the message unit.

3) Scoring, the performance measure which is obtained by the tester at the end of the interaction.

Coders will be involved with only the first two processes.

MESSAGE UNIT

This is the basic unit of analysis. Most simply, a message unit is composed of an attempt to transmit a single thought or idea from the mother to the child, along with the child's immediate reaction to that transmission. Such a thought might be task information, a question, a threat, or a reprimand. The key question for the coder is: Where does one "thought" stop and another begin.

I. The Trained Observer

In general, objective indicators such as syntax, a long pause, or the child's reply signal the end of a message unit. These and other indicators are discussed below. However, it should be remembered that these indicators are only clues. Since this is a semantic analysis, we must constantly be concerned with the thoughts transmitted. We rely on the coder's trained judgment - not on rules to be applied mechanically. The judgment required is similar to that made by raters in scoring a TAT or Rorschach or in carrying out a naturalistic observation. The final criterion is: What judgment would the majority of intelligent, trained, and unbiased observers make about the units of this interaction. We do not pre-

tend to understand what is going on in the head of the mother or child. We can only observe the overt behavior - in this case the codes passing between two people. Observers trained in our system can ascertain the units of this communication process with a high degree of reliability.

In addition to remembering that the analysis is a semantic one, the coder should remember that the analysis is of a teacher-learner situation. The message units are primarily divided and rated from the standpoint of the mother as initiator. Thus the child's response always indicates the end of a message unit. In rare cases the child may initiate a message unit after responding to the mother's message.

This form of unitizing is derived from our assumptions about human communication. It deals only with diadic communication down a status gradient; that is, two people of unequal status talking. The person with higher status is attempting to transmit information to the other. To transmit successfully the person of superior status must 1) engage or motivate the person to attend, 2) present the information clearly, and 3) monitor the receiver's understanding of what was transmitted by setting up feedback opportunities. The codes which are described in this manual are designed to measure this process.

II. A Pause

A pause which lasts for some time is signaled by three dots on the typewritten manuscript. When rating a case the coder must always listen to the interaction precisely because some of the pauses that are in the interaction are not recorded by the transcriber in such a way. A pause as short as a person taking a breath is an excellent indication of the end of a message unit. The rationale for the time break as an indication of a break in meaning comes from the most

elementary feature of any coding system; that is, that the larger the unit of meaning the longer the break between it and the next unit; thus we must pause briefly between speaking words so that people can understand them. The pauses are more likely to occur between phrases, and of course the pause is longer between different types of messages. Thus one good clue to the end of a message unit is the length of time before the next message unit begins. This, like all the rules which follow, is not an absolute, but a guide.

III. Child Response

A response from the child always signals the end of a unit whether it is solicited or unsolicited; if it directly follows a mother's message it is considered part of the same message unit. The only time a child's statement is coded as a separate unit is when it follows his own response without any intervening message from the mother. For example:

Mother: This is tall.

Child: And has X on it./ I don't want to do this any more.

A response occurs when the mother sends a message and the child replies verbally or with some physical action. If the child merely remains passive, this does not necessarily end the unit. The child's response terminates a unit even in cases where the mother follows the child's response with a continuation of her earlier message. The rationale is that in spite of the fact that the mother intended to send a longer message, she was interrupted, and had to reformulate her message after the child's response. Message units are primarily rated from the standpoint of the mother as initiator.

IV. Syntax

Syntax is often a useful guide to meaning. A message unit will normally

consist of a simple sentence with only one subject, verb and direct object (although an unlimited number of indirect objects may be present). The subject may be understood from the preceding message. The simple sentence will be a unit unless other indicators call for divisions, such as when the child responds. Dependent clauses and dependent phrases are generally included in the same message unit. "We put this here because it is tall" is a single message unit. Independent clauses are usually separated. When the subject and verb of the second independent clause are implied by the preceding clause, each clause is rated as a separate message unit. For example, "Do you know your X's/ and your 0's?" is two units. Independent clauses can generally be identified by a conjunction. For example, "This is an X block/ and this is an 0 block" would be coded as two message units. The one conjunction which does not follow this rule is "or" which always joins two dependent clauses which must be coded as a single message. Prepositional or adverbial phrases or clauses are not coded as separate message units, as in "The block is small with an X," or "Look at the block on the board." Exceptions to these rules can be made, however, on the basis of timing.

V. Context

All the rules for unitizing must be used in terms of the meaning given by the context. This applies only to the context which precedes the statement; the decision to unitize is never based on what the mother or child says at a later point in the interaction. Meaning must be in terms of what an objective observer would understand having heard the interaction which had taken place up to this point. This is the second reason for listening to the tape and making the designation of message units while listening.

VI. Incomplete Thought

A message can be coded as a unit even though it does not represent a complete thought, when such a message is interrupted by the other speaker. Thus in the case, "Now I want you to" interrupted by the child saying "I don't want to play this" would be a message unit. When the dependent clause is interrupted the principal clause is coded as a separate unit and the dependent clause is coded as an interrupted message. This is in contrast to the general procedure of unitizing the dependent clause in the same unit as the independent. The rationale here is that the meaning has been received for the principal clause and is therefore not incomplete even though the dependent clause or phrase is incomplete.

VII. Repeat

When a word or phrase is repeated verbatim, with no break and no change in the child's behavior, the repetitions are not separated. If "stop, stop, stop," is said without an interruption by the mother pausing or by the child making some comment or action, it is coded as one unit. The rationale for this is that no new information is added by the repetition of this phrase even though the number of times it is stated does tend to add emphasis. Emphasis is also added by tone and by volume which are not picked up in the analysis in its present state, thus from a semantic point of view repetition of identical words or phrases without a pause or interruption are coded as a single message unit. If a message is repeated it is necessary to establish whether any feedback, physical or verbal, was given by the child after the first statement. If a response was actually given by the child, the second statement may be Feedback Reply and two messages are involved. If there was no intervening response, however, the

repeated statement will be scored as one message since there is no additional information carried by the repetition.

When the speaker qualifies with a phrase which does not change the meaning, this phrase is included in the preceding message unit. For example, "Reminds me of seeing this before, like this before" is coded as one message unit. But when a phrase changes the meaning it is coded separately. "This is an X - I mean an O" is coded as two units.

VIII. Verbal Tic

Many words such as "now," "see," and "OK" appear so frequently as to be almost meaningless terms. The solution to analysing these troublesome words is first to identify whether they come at the beginning or the end of a message unit. They are almost never coded separately when they precede a message unit. This type of language may be a mannerism which is unconsciously injected into all conversations or it may function as a noise-making technique to hold the channel open to prevent interruption by the other person or it may be autistic primitive speech (the person is merely talking to himself, i.e., "let's see"). Words with these same features may be unitized separately when they appear at the end of a message unit. The words "see?" or "OK?" are often coded as a separate message unit at the end of a preceding unit. They are then rated as questions with no discriminations. When a mother has an "interrogative style", her questions should be broken into separate units, rather than be considered as verbal tics. The clue to the difference between an interrogative style and a tic would appear to be that in an interrogative style many different forms of questioning are used, while in the case of a verbal tic several examples of the same word will be used on the same page in precisely the same place at the end

of the message unit. The rater should ask as always, what do I understand from the mother's overt behavior at this point? Is it questioning (unitized separately); or is it a mannerism, a noise-making device, or autistic speech? (or verbal tic and not unitized separately).

IX. Miscellaneous

A message unit may be primarily physical or primarily verbal, but most units will contain both elements. Distinctions between the two must be made in the rating (this is explained below). A physical gesture may cover more than one message unit. When a mother holds up a block and describes its characteristics, a point is scored for each relevant message. A gesture which occurs during a message usually does not end the message but is considered to accompany the verbal communication and is rated as part of the whole unit. The only exception might be in the case of demonstrations which will be described below. A message unit is generally not longer than one breath. The only exception is when a sentence is repeated.

Occasionally, message units are totally unintelligible. In this case a dash should be marked in all columns except under Verbal Messages (columns 1 and 2) where a 15 should be coded, and under Feedback Given (columns 4 and 5) where a 13 should be coded.

In rare cases, communication may be non-verbal; for example, the mother might give a command to which the child may give an incorrect physical response. The observer notes that the mother looked sternly at the child, causing him to place the block in the correct place. The mother's stern glance initiates a new message unit. However, if the child's first response is incorrect and then his next response is a spontaneous correction with no intervening statement

from the mother, one message unit is rated, as correct. If the child responds correctly, then spontaneously makes an incorrect response, one message unit is rated as a physical incorrect. The intention in coding this way is not to pick up the thought processes of the child, only to record his actual physical response.

TASK-SPECIFIC vs. TASK-ORIENTED MESSAGES

It is necessary to distinguish between task-specific and task-oriented messages to facilitate the coding. Task-specific message units are those in which specific information about any of the elements of the field which are essential to completion of the task is given by either the mother or the child. (Verbal Messages numbers 01, 04-10, and Feedback Given numbers 03-09, 11 are task-specific.) Task-oriented message units are those which contain general information about the task and the objects under consideration. For example, in the eight-block sorting task any message relating to characteristics of the blocks such as height and mark would be task-specific.

CODING CATEGORIES

Types of Verbal Messages - Columns 1 and 2

These messages may be thought of as grouped by task specificity. It might be helpful to note that Verbal Messages 01, 04, 05, 06, 07, 08, 09, and 10 are task-specific messages. 02, 03, 11, and 13 are task-oriented statements. All others are either non-task-oriented or are unscorable. The messages may also be thought of as being of three primary types: those which are directed at informing the child (01, 02, 03); those which request feedback (04, 05, 06, 07); and those which reply to feedback (08, 09, 10). There are also two secondary types of ratings used for special situations when the action is initiated by

the child or when the attempted verbal message is incomplete. These types of message are general rather than hard and fast. For example, engaging and gearing, while generally intended to impart information, are sometimes used by the mother in response to tune-out by the child. Such messages might also be intended to elicit certain responses from the child. In this sense there is a coordination between the actions of mother and child. In any case, the main emphasis falls into the primary types set forth above.

00 - No verbal message. This rating is used in only two situations: when the child initiates a message while the mother says nothing, or when the mother undertakes a demonstration after the completion of the previous message.

01 - Task-informing. This is a message in which the mother lectures or imparts any specific information about the task. When informing statements focus, 01 takes precedence over 13. 01 also takes precedence over 03. All feedback requests (04-07) take precedence over 01 (see below) as do replies to feedback (08-09).

02 - Engaging. This is a non-task-specific but task-oriented message used to involve the child in the task, generally by using some kind of rewarding technique. One example of this kind of message is "This is a game like the one we have at home." These messages also occur when the mother talks with the child about non-task matters during the course of the interaction. For example, talking about lunch, or going home, or a conversation about the tester might all be scored in this category if they are directly motivating. Other such non-task conversation should be rated 14; 02, however, takes precedence over 14. When the child tunes out and the mother essentially follows his lead with the intention of regaining his cooperation, the ensuing messages are primarily aimed at

motivation. They are scored in this category.

03 - Orienting. This is a general statement used by the mother to develop a set in the child's mind for the task which will follow. Such a statement orients the child and maintains his interest, i.e., tells the child what is to be done, but it neither gives specific information nor tells how the task is to be done. Two examples are: "The game is to put the blocks in a special way." "Now we'll do it again." Note: messages in this category need not be statements. A question such as "Shall we do it again?" might also be scored as orienting.

04 - Command-physical. Command messages are task-specific; and they take precedence over all others. Whether or not a message contains new information, if it contains a command that the child do something, it is rated as a command. A physical command is scored whenever the mother demands that the child do anything physical. It must be noted that this category is used only when more than a visual action is required by the child. A visual action alone is scored under Focusing or Verbal Point, number 13, as is a compound sentence in which the first unit contains no meaningful discrimination: "Pick it up/ and put it where it goes." The second message unit would be rated 04 for verbal message, but the first unit is rated 13.

05 - Command-verbal. Here the command is that the child respond verbally. This is distinguished from a question in that the child has no option in his reply. A statement beginning "Tell me ..." is generally in this class. The content might range from a simple request for affirmation of understanding to requiring specifics about the placement of the blocks.

06 - Question-physical. This rating refers to the mother's requesting the child to do something physical ("Would you give me the block with the X on it?", or "Can you show me the tall X?").

07 - Question-verbal. This is used when the child is requested to respond verbally. Again, this may range from a simple yes/no answer to a full explanation.

08 - Affirmative reply to feedback. In this case the mother replies to the feedback received in the previous task-specific message with a statement of approval, confirmation, or praise. Generally, only the first message following the feedback will be scored as a reply, succeeding statements being placed in the categories into which they would have been placed had there been no feedback. The only exception occurs when the mother follows with a repetition of the child's message. In such cases the second message must be coded for discriminations.

A statement which is neither clearly positive nor negative should be scored by the predominant nature of the reply. A statement which is truly half positive and half negative which cannot be broken down should be scored as positive, such as, "That's almost right."

When a mother follows a child's feedback with information which also affirms, the unit is rated as affirmative and rated for discriminations. Only the first such message following a reply will be rated as affirmative. However, a standard affirmative reply such as "Yes" or "That's right" may be rated affirmative in addition. For example:

Child: "That's a circle."

Mother: "A circle./ Yes."

The mother's reply would be broken into two message units, both rated affirmative and the first rated for discriminations to indicate its information content. Thus all message units rated in this category which contain task-specific information must be rated for discriminations. (Discriminations are described below.)

09 - Negative reply to feedback. This is the reply in which the mother tells the child his response was incorrect. It may be a statement of fact or blame, or a critical comment. It is always task-specific. If the mother does not qualify the "no" with new information, the words accompanying the "no" are included in the message unit. For example, "No, not that."

When the mother follows incorrect feedback with information which tells the child his response was incorrect, this message is rated 09 and rated for discriminations. If the mother replies with several consecutive units which have information but are a negative reply to feedback, the first unit is rated 09 and the other units are rated as informing, 01.

10 - Informing-reply. Here the mother merely answers a task-specific or task-oriented question put to her by the child. Care must be taken to distinguish information elicited by the child from that initiated by the mother.

11 - Control. Here the mother is attempting to obtain the child's cooperation, or direct his action through some implied punishment. It is this element of implied punishment or threat that generally distinguishes this rating. It is scored as a response to the child's behavior although it is conceivable that the mother might use this mode as a preventative. Messages in this category imply the mother wants the child to do things precisely the way she tells him to. It discourages initiative on the part of the child. Control messages need not be task-oriented. For example, "No, wait," would be coded as a negative, and then the second message would be coded as a control. Control takes precedence over focusing and informing.

12 - Incomplete or interrupted sentence. This class is used in two instances: when the mother is interrupted by the child, or when she changes her mind in mid-phrase and turns to a new sentence to complete her thought. This is not a

catch-all category to be used when none of the above apply. It is, rather, an attempt to get at the number of changes of direction of the mother's thought as well as to account for the verbal meanderings which crop up in normal speech. "Er, well..." might be scored in this category.

13 - Focus or verbal point. This category is used when the mother attempts to focus the child's attention on a specific portion of the field. Care should be taken to distinguish this from commands on the one hand and from control on the other. The intention of the speaker is to have the child orient himself. This type of message is never a question. Questions such as, "See that?" are coded as questions with no discriminations. Because of the nature of focusing, a focus unit generally precedes the command, information, or question. It seems unlikely that one would focus after giving information. According to this rationale, in a statement such as "These go here,/ see?" the second message unit is rated as a question, not a focus. Focuses can be differentiated from informing in that they give very little specific information. They can be distinguished from commands and engaging because there is little positive or negative reward implied in them. Focus is not used to change the child's attention but merely to direct it. Focuses may often be accompanied by a physical point, but this is not necessary.

Often very little information is implied in a focusing type of message unit; nevertheless, this message, by convention, will be unitized separately. In the example, "Take this/ and put it where it goes," the first phrase is coded as a focus. This conforms with the syntactic procedure for dividing message units.

14 - Non-task communication. This type of communication occurs when the mother's message is "away" from the task situation. She may follow her child's non-task communication or she may initiate non-task communication. It is dis-

tinguished from engaging, in that the mother in this type of message does not attempt to motivate the child toward the task. A good question to ask in coding a non-task as opposed to engaging message would be, "Does this statement attempt to get the child to work on the task?" If it does not, as in the example, "That's the telephone," then it is non-task communication. This rating takes precedence over informing when the information contained is non-task-oriented. This rating also occurs when the mother engages in conversation with the tester, whether to ask a question or to respond.

15 - Unintelligible. This category is used when the mother initiates a message that cannot be understood but the child responds verbally and understandably in the same message unit. If both the mother's and child's statements are unintelligible, this category should still be used - even though zeros are placed in all other columns.

Generally the following rules of precedence apply: control (11) over informing (01) or focus (13); informing (01) over orienting (03); engaging (02) over non-task communication (14); feedback requests (04-07) or feedback replies (08-10) over informing (01).

Physical Messages - Mother - Column 3

This column is generally scored through interpretation of the observation. At times, a gesture is not specifically noted, but must be inferred from the verbal message. One must not assume that there is no action occurring simply because it is not specified. The emphasis in these ratings is on task-specific messages. Others (except controls) are not scored.

00 - No message. This class is scored only when it is clear that no task-related gesture is actually occurring. If the mother is holding a block throughout a

series of messages, "points" are scored for all the messages even though no new gesture occurs. This category is, of course, used when the mother's gestures are in no way related to the task.

01 - Point. This class includes all manual actions of the mother which are accompanied by verbalization. It is an attempt to clarify the task-specific verbal message. Note: if the mother demonstrates while using verbal clues, her demonstration is nevertheless scored as a "point". Thus the class includes actual points, holding a block, or placing it on the board. A prolonged point is rated for every relevant message unit. A message beginning "This is..." is generally assumed to be accompanied by a point. The important fact is that when a point accompanies a verbal message, both the physical and verbal actions are essential in transmitting the message.

02 - Physical restriction. This class is used only when the mother actually touches or reaches for the child or holds the test materials from him in an attempt to restrain his actions. It will generally be accompanied by a rating of 02, 11, or possibly 03 in the verbal message category. This rating is made for every message to which it applies if the action is prolonged. One must be careful, however, to determine when a physical restriction changes to a point. Physical restrictions are used to orient the child to the task activity when he is either inattentive or performing incorrectly. By holding back a block, the mother may keep the child from placing it incorrectly. As soon as she tells him where it goes, however, the action becomes a point.

03 - Demonstration. This is a series of task-specific actions carried out by the mother, but not accompanied by verbal task-specific cues. Thus the mother may say such things as "I'm going to do this, then this." The rationale here is that the demonstration should be coded because the major amount of information

is being transmitted by physical actions rather than words. If verbal task-specific cues are given along with a vivid demonstration, the message unit is coded as informing because, we feel, the verbal cues are much more potent in teaching.

Feedback - Columns 4 and 5

This category is always scored, regardless of the nature of the message unit. The child is always giving information to the mother, and this information can change at any time. The categories below are therefore designed to be exhaustive of all possibilities for feedback from the child. Except where noted, the classes are task-specific.

01 - Neutral. This class refers to those situations in which the child is not sending any overt signals to the mother. He is not tuning out, although his attention may not be total. The child is open for communication, but the essential point is that the mother is not receiving any specific indication of the child's participation in the task. This rating is also used when the child fails to reply to a feedback request.

02 - Negative task involvement. In this case the child behaves physically and verbally by in effect changing the subject or tuning out. The mother receives the information that the child is not task-involved and that the mother is not communicating. The child's message may be a negative verbal response to the mother, i.e., "Do you want to do it?" where the child responds "No." It may be initiated by the child himself, i.e., "I don't want to play this anymore." It may be behavior such as turning away or playing with the blocks.

It should be noted that the following six feedback categories, categories 03-08, have to do with the correctness of the child's verbal or physical task-

specific feedback. Physical responses take precedence over verbal responses. The criterion for deciding whether the feedback was correct, intermediate, or incorrect is what the rater judges the mother's expectation to be from what she said immediately preceding this or earlier in the interaction. For example, the mother has introduced the concepts height and mark in the immediate, preceding context. She then points to a block: "What is this?" The child gives only one concept: "It is tall." If the mother's expectation seemed to be for "tall X", the child's response would be rated as an intermediate.

03 - Verbal affirmative. Here the child demonstrates that he understands the situation. Responses in this class are correct statements about the task. Again the judgment of what is correct is made in terms of what the observer believes is an objectively correct answer to a question or command. (Note: All responses in this class are task-oriented. Scoring a non-task statement will be described in another category below.) When a correct verbal response accompanies a physical response, the physical response takes precedence. Therefore, responses rated as verbal are not generally accompanied by task-related physical action. Verbal responses which accompany behavior are, however, rated for the concepts they contain, although the feedback message is rated in the physical categories (see 07 or 08). It is possible, in rare cases, that the child will nod or point in response to a question. In such cases this category is used when the question was task-specific and the gesture is definitive. If the nod indicates simple agreement it is coded 12. In such cases the gesture is a simple substitute for a word. A zero is then scored for number of child's words and for concepts.

04 - Verbal intermediate. In this case the child indicates that he partly under-

stands the task. This information may be initiated by him, or it may be a partially incorrect response to a question. In this case it is also possible that the child may not actually speak his response. Such cases, which are very unusual, should be handled as described in 03 above.

05 - Verbal negative. Here the verbal feedback is generally task-oriented in such a way that the child indicates he does not understand what is going on. It may be an incorrect response or an "I don't know." In any case, it tells the mother that there is something wrong with her communication. Cases in which the child does not respond to a question or command will not be rated in this class. Again, in this case it is possible that a nod or shrug must be rated as verbal feedback. Rating of such situations is described under category 03 above.

06 - Physical action-correct. This class is used primarily in response to requests from the mother. The expected physical response might be accompanied by a verbalization. However, we assume that the physical response is more potent. Therefore, such double messages are usually scored in this category. The only exception would be when the concept is verbally elaborated while the physical action is minimal. The range of behavior in this class includes correct placement of a block as well as choosing the proper block from a group.

New message units should not be manufactured just to make this rating. Thus, if the mother says, "Place the X's together," the fact that the child chooses to pick them up one at a time rather than scooping them all in one movement should not be distinguished by separate message units. This type of rating is tapped by discriminations which are described later. Physical action-correct is a feedback code which tells whether the child in the opinion of the rater responded to the mother's request correctly, in an intermediate way, or incorrect-

ly; it does not reflect the number of physical notions involved. However, if a global command is given such as "Do that again," and the child carries out major steps by first separating the blocks by mark and then separating each of the groups by height, these separate thoughtful steps would be coded as separate units.

07 - Physical action-intermediate. This is used when the action is part correct and part incorrect. For cases where verbal responses occur also see 06 above and 08 below.

08 - Physical action-incorrect. This category is used when a child picks up the wrong block or places one incorrectly. Again, we expect little verbalization to accompany these actions (see above). If the child should make a correct statement while performing the action incorrectly, this category is generally used. Only if the statement is quite explicit and detailed while the action is minimal would the message be scored as intermediate (07).

09 - Requests task-specific information. In this case the child requests further information about the task, presumably to increase his understanding.

10 - Responds to non-task-oriented message. This category is scored only when both mother and child are essentially "away" from the task situation.

11 - Volunteers unsolicited task-specific information. This is not feedback in the strictest sense, but it does give the mother information about the child's understanding or progress. The child is, in a sense, taking over the role of teacher by volunteering task-specific information. In this sense he is probably jumping ahead of the situation. Note that to be rated in this class, the information must be relevant. It may refer to a different aspect of the situation, or it may change the subject or stop the communication.

12 - Verbal indefinite-positive task involvement. This class is scored whenever the child indicates that he is happy or agreeable with the task situation. It is rated only in conjunction with informing or non-task-specific messages from the mother. The child's response, however, does not indicate his level of understanding. This type of message essentially lets the mother know that the child is involved, and she may concentrate her efforts on communicating the task. This could be a physical act, such as a nod, or merely picking up the blocks but not placing them. This category is a converse of category 02. It must be distinguished from verbal correct (03) or physical correct (06) because verbal indefinite-positive task involvement means that the child makes a response which defies the rater's ability to determine whether he understands what he is doing. If the mother asked, "Is this an X block?" and the child replied, "I don't know" it would be coded by convention as a verbal negative (05). Also by convention, one primitive speech pattern for children should be coded in the 12 category. It occurs when the child echoes the last few words of the mother, e.g., "Show me a tall X," to which the child replies, "a tall X;" this reply is coded as a 12.

13 - Unintelligible. This category is used when the child's feedback response cannot be understood, even if the mother opens the message unit with an understood message. Again, as in Verbal Message # 15, if both the mother's and child's statements are unintelligible, this category should be used even though zeros are placed in all other columns.

Attention - Column 6

These ratings are measures of the child's involvement with his mother. They do not necessarily indicate his involvement with the task. This point must

be carefully noted. If the child's attention wanes and he begins to tune out, the mother may attempt to motivate him through engaging or control. His attention may or may not be elicited. The mother may follow him in a conversation which is non-task oriented. The coding in other categories will reflect this.

The ratings in this column can best be made by reading the observation, since the child may not be responding verbally. A rating must be made for every message unit. The rating will be repeated until a change is noted by the observer or until a verbal response on the transcript suggests a change in the child's attention.

<u>01 - Full attention</u>. This class refers to the child's sitting quietly, watching and listening to the mother. He might be fingering a block or engaged in some other non-involving motor activity and still be rated full attention. He may also, of course, be responding to the mother or volunteering task-related information. In any case, to give this rating there should be little doubt that the child is primarily engaged in trying to follow the messages of the mother.

<u>02 - Part attention</u>. In this case, the child appears to be listening to the mother but may be distracted, e.g., attempting to play, impatiently kicking, or tapping his finger. To use this rating, the observer must decide whether the child is still at least partially watching and listening to what the mother is doing. This is what distinguishes part attention from no attention. The distinction of part attention from full attention may be partially subjective. It might be best made by asking, "Would the average teacher be satisfied with this amount of attention?" If the answer is "No," a rating of part attention is given. While the child's eye activity and the amount of distracting noises are indicators of attention, no single criterion can be used. We must rely on the

observer to indicate when there is actually a change in the attention of the child. As in the above case, the same rating continues to be made until a change is noted.

03 - No attention-tune out. In this case the child has completely tuned out. He may turn from the table, begin to actively play with the blocks, or try to talk the mother into doing something else. This column must always be rated in connection with columns 1 and 2. As a criterion question, the observer might ask whether, if the child were interrupted at this point, he would be able to repeat the last message from the mother.

Discrimination - Column 7

Discriminations. Discrimination refers to cognitive organization of the task-specific qualities of the objects. It does not involve merely perceptual distinctions the child might make about things that are not related to the task objects. Two distinctions must be clearly in mind if this category is to be coded correctly; principles of servo-theory on the one hand, and the schema for organizing information proposed by MacKay on the other. In servo-theory one distinguishes between the perception of the stimulus and the decision rules by which the mechanism acts on what is perceived. The implication when the mother is viewed as a servo-mechanism is that the mother's informing (Verbal Message #1) messages are attempts to direct the perception of the child, while her commanding (04, 05) and questioning (06, 07) messages are attempts to develop decision rules within the child. To receive information, the child must make perceptual discriminations, but to respond to a feedback request (command or question) he must develop decision rules; i.e., he must discriminate more actively. Thus informing messages are coded less stringently for discriminations than are com-

mands or questions. An informing statement which uses the same concepts as does a feedback request will be coded for discriminations, while the command or question will not be: "This is a little X" (coded 03) vs. "Is this a little X?" (coded 00). When a question can be answered simply by yes or no, we generally consider that active discrimination was not required. Thus, coding informing statements for discriminations requires different criteria than coding questions for discriminations. Discriminations in questions relate to what the child must discriminate to answer. Discriminations in informing relate to what the child must discriminate in order to understand. If a question requires a simple yes or no answer, there are no discriminations required.

MacKay has distinguished two types of information. Applied to our situation, a "logon" is a dimension of meaning such as height or mark. A "metron" is a division or a section along that dimension of meaning. Thus, marks in the case of the eight-block sorting task are divided into X's and 0's, while height can be divided into two metrons, tall and short. For example, "This is an X block" is one discrimination because the child must be able to distinguish an X block from all other blocks. If, however, the mother says, "This is a block," no discriminations would be required of the child because this does not require a task-specific discrimination. Therefore, only task-specific information in terms of the two basic dimensions of the block sorting task (height and mark) and the two logons in each dimension (tall-short, X-0) are used in discrimination rating. The rating is made not on the basis of how much evidence the child gives of actually discriminating, but on what an objective third person who had been following the interaction from the beginning would be led to discriminate if he heard the last message unit spoken. The question is: What does this message call for in the way of discriminations, given the preceding messages? Metrons

and logons need not be specifically mentioned if they are implied in the immediately preceding message units. In fact, it is by moving from a unit where the metron or logon is mentioned to a unit which combines them that the process of "bonding" occurs. Bonding occurs when the mother takes two metrons on a logon and shows that they are both the same logon or when she takes two logons, or two metrons from different logons, and places them together. We believe this is an important feature in teaching. For example, "Now these two are very tall/ they both have crosses on the top/ that's why they are standing together" gives an example of one metron on one logon bonded to another metron and another logon. The first message has one metron discrimination. It is not until the third message that the two metrons from different logons are bonded explicitly, but the second has bonding implied. Thus, the second and third message units would receive an 08 code for discriminations. Another example would be, "This is an X/ and it goes with the tall ones," where the first message unit would be one discrimination and the second, two discriminations.

Discriminations are coded in column 7. They are coded only after certain verbal messages: 01, 04-07, 10. In cases where an affirmative or negative reply to feedback (08, 09) contains information, it is coded for discriminations. The categories are as follows:

00 - No discriminations. No discriminations is when the mother asks a question which is not task-specific, or gives a command which is not task-specific. That is, the statement or question does not require task-specific discriminations to answer it. For example, "Put them there" (points) requires no discriminations in the way they have been defined in terms of task-specificity. However, "That is an X block" would require one discrimination. The reason for saying that perceptual discriminations are less stringent than those dealing with commands or

questions can be demonstrated by the command "Put that X block there (point)," which would not have a discrimination since all elements of the field would be specified.

01 - Metron. For a unit to be given a 01 rating there must be one division along a single dimension and then the message unit, e.g., "This is tall."

02 - Two metrons on the same logon. Here two metrons are mentioned or implied which are on the same logon. For example, "Is this an X or an 0?" mentions both metrons and the logon "mark".

03 - Bonding. Bonding occurs when two logons or two metrons on different logons or a metron and a different logon are mentioned or implied in a message. In the typical example of bonding, two metrons of different logons are mentioned or implied in the same message unit - e.g., "Where does the tall X go?" The coder must be careful that this discrimination is not missed when it is implied by previous message units rather than explicit in the unit. In the example, "This is tall/ and this has an X on the top/ so that is why they go together," the last unit is rated as bonding based on the implication of the two previous units.

04 - One logon. One logon such as "Sort them by height" is mentioned.

05 - Two logons. This is a rather rare situation, such as when the mother says, "Height and mark are important."

06 - One metron requiring the child to select two or more blocks. The distinction in this coding is to give us the ability to analyze the sequence in which the mother makes a single command or informs and the child must make several moves to execute it properly. It will be recalled that in the coding of the feedback, these are not coded as separate message units since they would

inflate the number of units artificially. This information is important, since asking the child to perform several actions sequentially must be recorded in the rating for discriminations. This discrimination category and those which follow provide the opportunity to do this. In a statement such as "Give me all the 0's," the coder knows that there is more than one 0 on the board and that the child should perform a discrimination of one metron repeatedly. If the one metron discrimination is to be made by the child two or more times in terms of the message that is sent by the mother, the discrimination is coded 06. An example of an informing message coded 06 for discriminations would be "The X's go together." However, "Are these X's?" is coded 0 discriminations because it requires a yes or no answer.

07 - One logon repeated. If the situation requires repeated action similar to category 06 above but in terms of a logon, then the code 07 is entered for discriminations. This might be the case where the mother says, "Sort them by height."

08 - Repeated bonding. The discriminations which would be rated in code 03 above are given an 08 code if they call for repeated bonding by the child. As in codes 06 and 07, the child is asked to make repeated discriminations; for example, "Put the tall 0's together."

09 - Global. This rating is given when a discrimination is required but when it is impossible for a third person objectively reading the transcript and listening to the tape to ascertain how many discriminations are required to complete the task successfully. An example is, "Now you do it." In a sequence of questions about the same metron or logon, it may be necessary to rate the first question as 09 or global. If the child answers this first question with a

discrete number of discriminations and the mother indicates that he is correct, then the next question, if it is phrased similarly to the first, will not be coded 09 but will be given the number of discriminations indicated by the child's correct performance. For example, if the mother says "What is this?" this would be rated as global discrimination. If the child answers "An X" and the mother says"Right," then when the mother asks, "What is this?" it will be coded as one discrimination rather than 09 because semantically it is clear that the mother wants the child to make one discrimination, "X".

Number of Mother's Words - Columns 8 and 9

This category refers merely to the total number of words used by the mother in a single message unit. Contractions are counted as two separate words.

Number of Child's Words - Columns 10 and 11

This category refers merely to the total number of words used by the child within a single message unit. Again, contractions are counted as two separate words.

COGNITIVE ENVIRONMENT STUDY

CODING MANUAL FOR THE BLOCK SORTING TASK

PRACTICE CASE

Coding Procedures

In order to facilitate coding it is necessary, first of all, to read through the protocol and to listen to the tape recording to determine the style and speech pattern of the mother. On a second listening to the tape, message units should be marked in pencil with a slash on the typed transcript; the observer's description of the behavior of mother and child must also be used to decide the length of the message unit. Whenever possible, the message unit number should be noted at the appropriate point in the observer's transcript to facilitate later coordination of the transcripts (not every message unit can be noted on the observer's transcript, since several message units may occur in connection with a single non-verbal action reported by the observer).

If the first time period in a case (from the beginning until the first time signal) is within five seconds of a full 30-second period, the first card in the deck should have a 16 in columns 1 and 2 and zeroes in all others with the exception of the columns for deck and case numbers. If there is any doubt about the time period, the beginning of the tape should be timed by the coder.

Cognitive Environment Study
SUBJ #6 Tape #1
8 block - 1

Transcript

Mother: See we have some blocks here you see,[1]/ and sit down,[2]/ we're going to place them the right, places here..[3]/ now we going to place them in the right spots..[4]/ and...this is how you place them,[5]/ see this 0 right here?[6]/See this big 0, this 0?

Child: Yes...?[7]

M You know why you put it in this block here, this space here?

C Yes.[8]/

M Because you have zeros up here,[9]/ all these

****

C But, but, but I don't want, I don't want to do those, mommy[10]/

M Well now lookee here[11]/ you're going to place them here![12]/ this is how you do it.[13]/ Look, uh uh look at this Susan,[14]/ you see this X?[15]/ This is an 0,[16]/ this an X,[17]/ and wherever you see[18]/ wait a minute now,[19]/ wherever you see an X on this board, you put it here,[20]/ and that is why you put it here.[21]/

Cognitive Environment Study
SUBJ #6 Tape #2
8 block - 1

Observer's Description

Beginning of the eight block test, tester leaves the room to get the child... mother has the board in front of her, four groups of the eight blocks...with the extra blocks off to the side, she sits with elbow, her left elbow on the chair, holding her chin in her hand, as the child comes in she smiles...mother says see we have some blocks here you see,[1]/ she moves the child, moves the chair back so that the child can sit down, child sits down, takes the extra blocks, fingers them, knocks a few over, lays them down flat, she was going to build with them, mother leans forward and she's pointing out the marks... mother picks up the tall 0, which is red, and places it with the tall 0's , she says

****

you know why it goes here[8]/ and she says something about it having the same mark, the child says she doesn't want to do that, she is playing with the small

blocks, taking one of the eight blocks off the board, and plays with it, mother took up tall X which is green and as the mother talks the child builds with the extra blocks, doesn't pay any attention to the mother, mother's pointing out the ah, the X's, on the tall, X's...the child has

DESIGN OF THE CODING SHEETS

For each case (pair of subjects), each message unit was coded on a single 80-field IBM card; each such card contained information about the interaction, as described above, in the format:

Column (Field)	Item (Variable)	
1-2	Verbal Message	Mother
3	Physical Message	Mother
4-5	Feedback Given	Child
6	Attention	Child
7	Discriminations	
8-9	Mother's Words	
10-11	Child's Words	
12-70	Not Used	
71	Minute (time period in which the message unit occurred)	
72-74	Message Number (Card Number, ordered serially from first unit)	
75-77	Case Number	
78-80	Project Identification Number	

The actual coding sheets used in the Cognitive Environment Study contained columns labeled as above, with 20 lines or rows in each column; thus 20 message units, or 20 cards, could be coded on a single coding sheet.

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DERIVATION OF MEASURES FROM THE CODING ANALYSIS OF MESSAGE UNITS

The coding analysis described above provided the basis for several measures of maternal teaching and child response during the block sorting task. Measures reflecting the subjects' performance in the various categories were derived by summing to get totals or, more typically, by converting frequencies to percentages of the total. Percentages were usually obtained by dividing the number (frequency) of message units coded in a given category by the total number of message units in the interaction. Unless otherwise stated, the percentage measures to be described below are based on the total number of message units as the denominator.

MATERNAL MEASURES

1. Mother's total words: Total words from the beginning of interaction until mother called the tester.

2. Mother's words per minute: After excluding the mother's words occurring during the first and last minute (because these were usually not full minutes), the reduced total number of words by the mother was divided by the number of complete minutes.

3. Percent Informing: Total message units coded as informing (mother categories 01 and 10) divided by total units.

4. Percent Engaging: Percentage of units coded in mother category 02.

5. Percent Gearing: Percentage of units coded in mother category 03.

6. Percent Requesting Physical Feedback: Percentage of units coded in mother categories 04 and 06.

7. Percent Requesting Verbal Feedback: Percentage of units coded in mother categories 05 and 07.

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8. Percent Controlling: Percentage of units coded in mother category 11.

9. Rate of Positive Reinforcement (affirmation): This measure coordinates mother and child coding. The number of correct responses by the child (child categories 03 and 06) which were immediately followed by affirmation (mother category 08) is divided by the total number of correct responses by the child (total units in child categories 03 and 06). When converted to a percentage this measure reflects the tendency of the mother to react to correct responses by her child with immediate positive reinforcement or affirmation.

10. Rate of Negative Reinforcement (negation): This measure parallels the preceding one except that it involves the mother's reaction to errors by her child. Scores are obtained by totaling the number of errors (child categories 05 and 08) which were immediately followed by negation (mother category 09) and dividing by the total number of errors (total units coded in child categories 05 and 08).

11. Direction of Reinforcement (affirmation vs. negation): This measure is based on the previous two. Scores are obtained by dividing the rate of positive reinforcement by the sum of the rate of positive reinforcement and the rate of negative reinforcement added together. When this measure exceeds .50 it signifies that the mother was more likely to respond to a correct response of the child with affirmation than she was to respond to an error with negation. Values below .50 reflect a tendency to give negative reinforcement more frequently than positive reinforcement.

12. Percent Physical Messages: Percentage of total units accompanied by pointing or demonstrating by the mother (mother's physical message categories 01 and 03).

13. Specificity Index: This measure reflects the percentage of the mother's messages which contained task-specific labels (mother discriminations categories 01 through 08). The index is obtained by dividing the number of mother messages containing specific labels by the total number of units where specificity was applicable. The latter total included all units in which mothers were informing, requesting feedback, or giving feedback to the child (mother categories 01 and 04 through 10).

14. Global/Specific Ratio: This index is related to the previous one, but it focuses on one particular type of non-specific message of the mother - the message which contains no specific labels but nevertheless requires the child to discriminate the attributes of the blocks in order to comprehend fully or to respond appropriately. This is the "global" message, either a feedback request ("Put these blocks on where they belong.") or a message intended to convey information ("These blocks belong together.") in which the relevant attributes of the blocks are not specified. The index is obtained by dividing the number of global messages by the number of specific messages (total units in discriminations category 9 divided by total in categories 01 through 08).

15. Direction of Motivation (Engaging vs. Controlling): This index reflects the mother's relative use of the two types of motivating techniques. It is obtained by dividing the number of units coded for engaging (mother category 02) by the number of units coded for either engaging or controlling (categories 02 and 11).

CHILD MEASURES

Most of the child measures are simple word counts or percentages of units coded in the various categories (using the total number of units as the denomin-

ator). The following measures were used in our analysis:

1. Child's Total Words

2. Child's Words per Minute (excluding the first and last minute, as in the corresponding maternal measure)

3. Percent Passive

4. Percent Negative Task Involvement

5. Percent Correct Verbal Responses

6. Percent Part-Correct Verbal Responses

7. Percent Incorrect Verbal Responses

8. Percent Correct Physical Responses

9. Percent Part-Correct Physical Responses

10. Percent Incorrect Physical Responses

11. Percent Questions (task-specific)

12. Percent Volunteers Task Information

13. Percent Positive Task Involvement

14. Attention Score: This index was obtained by summing the attention ratings and dividing by N, yielding an average attention score.

15. Error Rate: This index gives the relative frequency of errors among the child's responses. It is obtained by dividing the error total (child categories 05 and 08) by the total responses which were either correct or incorrect (child categories 03, 05, 06, and 08). Part-correct responses (categories 04 and 07) are excluded.

16. Success Rate: This index refers only to the physical or placement responses of the child, and only to occasions where he was trying to place blocks according to both height and mark. It is obtained by dividing the total number of blocks

placed correctly on both attributes (category 06) by the total number of placement attempts (categories 06, 07, and 08).

SUPPLEMENTARY CODING OF SELECTED VARIABLES

INTRODUCTION

The previously-described coding concentrates upon the relative frequencies of the various maternal variables and upon the relative success of the children in their task-specific responses. It yields relatively little information about qualitative differences among subjects within categories of behavior. In order to collect data on differences in the completeness and specificity of the mother's task-specific teaching (informing, requesting feedback, giving feedback) and on differences among the children in their behavior during responses (especially maladaptive behavior which interfered with learning), additional coding analysis of the block sorting task was performed. This coding concentrates on those parts of the interaction in which the children were attempting to place blocks into their respective groups (i.e., making "placement responses"). For purposes of analysis the term "placement response" was reserved for responses of the children which met all of the following conditions:

1. The child was acting with the expressed or implied consent of the mother (eliminating instances where the child was playing with the blocks or where he began placing them before the mother finished her directions).
2. The child was to match by both height and mark simultaneously (eliminating occasions where there were only two groups differing on only one attribute).
3. The child was to find either the right group for a particular block or the right block for a particular group (either type of matching was considered

"placement").

4. The child made a commitment to a particular block or group of his own (eliminating instances where the mother precluded choice by showing the child where to put a block before he made a commitment). The commitment (and therefore the "placement response") consisted of an indication of a particular block or group as correct; a placement response did not necessarily include the actual placement of a block into a group by the child.

The coding system was devised to measure events occurring before, during, and immediately after "placement responses" as defined above. Placement responses occurred in natural clusters or units which began when the mother designated a particular set of blocks to be placed in groups, and ended with the placement and discussion of the last of the designated blocks. Ordinarily there were four blocks placed in a unit, since mothers typically removed one block from each group and asked the children to replace them. However, some units contained fewer blocks (if the mother removed fewer or placed some herself) and some contained more (reaching a maximum of twelve if they started with the board empty). Some measures were coded for every block placed, while others were based on events occurring in the unit as a whole. For purposes of description, the variables coded will be grouped on the basis of the units of analysis to which they apply. A summary describing the derivation of measures from the basic coding will follow.

ORIENTATION TO THE TASK

The "orientation period" was defined as including everything that transpired from the beginning of the task until the mother first asked the child to place a block according to height and mark (i.e., to make a "placement response"

as defined above). The child did not necessarily have to make the response, so long as it was clear that the mother wanted him to place a block; the conclusion of the orientation period was defined as coincident with the end of her first placement request. Six variables relating to the orientation period were coded:

1. Orientation to the Future: General statement of what is to come. The mothers were coded for whether or not (presence-absence) they gave a general overview of the task facing the child, using the present participle or future tense. The key consideration in coding this variable was the indication that events were to come in the future, regardless of the specific content with which the events were described. Examples:

"We're going to play another game."
"Now I'm going to teach you something else."
"Sit down, I have something new to show you."

2. Orientation to the Grouping Concept: Presence or absence of introduction of the idea that the blocks were organized in groups. Examples:

Present	Absent (borderline examples)
"These go together because..."	"These are alike because..."
"This one goes with those because they're all..."	"This goes here because it is..."
"The blocks in this group are..."	"These blocks are..."

3. Orientation to the Sorting Principle Concept: Presence or absence of introduction of the idea that blocks were sorted for specific reasons. The key consideration involved was whether or not the physical act of block placement was specifically and formally tied to the rationale. Examples:

Present	Absent
"Why does that go there?"	"How are these the same?"
"These go together because..."	"These are all..."

4. Orientation to the Mark Concept: The mothers' introduction to the "mark" concept was coded on a 4-point scale, with each mother receiving credit for the highest level attained at any time during the orientation period. Scale:

0. No Presentation. Mother does not refer to the marks on the blocks before the first placement response.

1. Verbalizing. Mother verbalizes labels ("mark", "X", "O") but does not contrast or focus on specific examples.

2. Focusing. Mother points to the marks, holds the ends of the blocks up to the child, and/or instructs the child to look at the tops of the blocks when she verbalizes the labels.

3. Contrasting. Mother groups the blocks by mark and/or points back and forth between contrasting marks while verbalizing the labels.

5. Orientation to the Height Concept: The mother's introduction of the "height" concept was coded on a parallel 4-point scale. Again, the highest level attained during the orientation period was coded. Scale:

0. No Presentation. Mother does not refer to the heights of the blocks before the first placement response.

1. Verbalizing. Mother verbalizes labels ("height", "tall", "short") but does not contrast or focus on specific examples.

2. Focusing. Mother places her hand across blocks of equal height and/or makes hand motions in the air while verbalizing labels.

3. Contrasting. Mother groups the blocks by height and/or points back and forth between adjacent blocks of contrasting height while verbalizing the different labels.

6. Length of the Orientation Period: The time spent in orientation before the first placement request provides a rough estimate of the completeness or redundancy of orientation and complements the previous codes which may reflect only a single instance of the relevant variables. To preserve the constancy of meaning across subjects, the orientation period time should include only the time spent in task-relevant activity. Non-task discussion or interruptions

devoted to discipline are not counted as part of the orientation time.

Any actions of the mothers up to and including the first placement request may be coded as part of the orientation period. Behavior relevant to the orientation period variables which occurs after the first placement response is not eligible for inclusion in the coding of the above variables.

In coding the specificity of maternal teaching in the orientation period (and also in the coding of instructions and feedback to be described below), material which is elicited from the child is treated as if it had been said by the mother. Thus if a mother shows the end of a block and asks the child to tell her the mark, and if the child identifies it correctly, the episode is coded as if the mother had pointed to the mark and said, "This is an 'X'."

PRE-RESPONSE INSTRUCTIONS

Coding of pre-response instructions is based upon maternal behavior immediately preceding placement responses by the children. This coding taps the degree to which mothers attempt to inject meaning into each individual placement response by giving specific, substantive instructions which cue the child's attention to the relevant attributes of the blocks (height and mark). When a mother verbalizes or elicits the height and/or mark of the block to be placed or the group to be sought, she is coded for specificity in her pre-response instruction, provided that the material precedes the child's commitment to a response. The following information is coded:

1. Verbalization of <u>Labels</u>: Verbalization of labels is coded if the mother describes the block to be placed ("That's a <u>tall</u> block with an '<u>X</u>'.") or the group to be sought ("Now where are some other blocks that are <u>tall</u> and have

an 'X' on them?"). Any synonyms for "mark," "X," "O," "height," "tall" and "short" are acceptable, including idiosyncratic substitutions such as "doughnut" for "O." Verbalization of labels is considered absent if the mother remains silent or if she gives directions which lack substantive, specific labels ("Now do this one"; "Where does that block go?"). Presence or absence of labeling of each attribute (height and mark, coded separately) is coded for every block placed.

2. Focusing: Whenever mothers verbalize or elicit labels before placement they are also coded for presence or absence of focusing attempts (separately for height and mark). "Focusing" in this instance subsumes all behaviors listed previously under either "focusing" or "contrasting" on the scales for coding the presentation of mark and height in the orientation period. Thus if a mother is coded for presence of focusing during a pre-response instruction, she will have gone beyond mere verbalization of labels by attempting to draw the child's attention to the relevant attributes or by making those attributes more salient in his perceptual field.

3. Specificity in Global Instructions: The previous two variables apply only to instructions which refer to a specific block which is about to be placed. When complete labels are given they apply only to the block to be placed and to the target group; they do not apply to other blocks on or off the board. Sometimes, however, mothers give directions which contain specific labels but which are more general in their application. Usually these global directions occur at the beginning of a series or unit of placement responses ("Put all the blocks that are the same height and have the same mark together"; "Put all these blocks on where they go."). Any such global directions which occur before the first placement response in a series are coded for presence or

absence of specific labels (present in the first example above, absent in the second).

POST-RESPONSE FEEDBACK

Coding of post-response feedback is based on maternal behavior which comes immediately after (and in reaction to) the placement responses of the children. Corrective feedback after errors, and reaffirmation of the attributes or the sorting principle after correct placements, are both included. Beginning with the moment at which the child first commits himself to a response, everything the mother says and does in relation to the particular block in question is considered in coding post-response feedback. Sometimes a block will be moved several times before being correctly placed, with the mother making statements before and after each placement. All of this activity is considered to be post-response feedback, however, since it is initiated by the child's original error and is triggered by child behavior which precedes it at each step. In some cases several minutes of interaction may be considered as feedback in reaction to a single placement response, although this is a rare occurrence. The coding of the mothers' post-response feedback parallels that for pre-response instructions:

1. Verbalization of Labels: Verbalization of labels in feedback is considered present whenever the mother names or elicits the height or mark of one or more blocks at any time during the feedback following a particular placement (height and mark are coded separately). As in previous coding, the substantive label must be verbalized; statements like "No, those don't look the same" or "That one goes here" do not qualify.

2. Focusing: Focusing in the coding of post-response feedback has the same meaning and is coded in the same way as in the coding of pre-response

instructions (see above).

The coding of maternal teaching described above often involves parallel measures which use the same criteria and ask the same questions. However, with one exception, the various codes refer to mutually exclusive subsections of the interaction. For example, no single word or action can be coded under both pre-response instructions and post-response feedback; it must be one or the other, depending upon its relationship in time to the child's commitment. Similarly, a pre-response statement cannot be both a specific instruction pertaining to a specific block to be placed or group to be sought and a global instruction applying to a series of placements. The only possible overlap involves the mother's global instructions (if any) and specific pre-response instructions (if any) before the first placement. This material is applicable for coding of the orientation period variables as well as the coding of the global instruction for the first unit and the pre-response instruction for the first placement response.

With a single exception, then, any part of the interaction may be classified as orientation, global instructions, pre-response instructions for individual placements, post-response feedback, or as something other than these. The latter activities, mostly either verbal drills in between placement series or interaction unrelated to the task, are not considered in the above coding (they are measured in the previously-described coding of message units).

CHILD BEHAVIOR VARIABLES

Child behavior variables are coded on the basis of their presence or absence during units or series of placement responses. A unit is considered to begin when the mother removes a number of blocks (if they are not already off

the board) and asks the child to group them by height and mark. Everything that occurs from the time the mother first indicates that the child is to place blocks until the last block is placed and discussed is considered part of the unit. The following variables are coded:

1. Task Resistance: Child behavior coded as task resistance includes overt attempts to leave the table or the room, complaints about having to do the task, refusal to pick up or place the blocks (sulking), protestations that the task is too hard or that the child is too tired, and demands to be taken home. The key aspect of task resistance is the overt expression of displeasure with the task itself. Behavior such as demands for refreshments or interruptive questions about non-task matters are not included under "task resistance", since the element of overtly expressed negative feelings about the task is missing.

2. Inhibition of Responding: Inhibition is coded if the child tries to avoid committing himself to a response by crying or pleading for help or if he makes repeated false starts or hovers over groups without releasing the block and appears to fear committing himself. The latter behavior must be distinguished from sulking or stubborn determination to withhold cooperation, which is coded as task-resistance. The key aspect of behavior coded as inhibition is evidence that the child is attempting to avoid committing himself to a response because he appears to be fearful of making a mistake.

3. Non-meaningful Block Placement: This variable is coded when the child appears to be placing blocks in groups without seriously attempting to determine where they belong and when there is no evidence of any pattern or sorting principle in his placement. Usually it will appear that the child is simply guessing randomly or that he is systematically going from group to group with

the knowledge that he will arrive at the correct place eventually. The latter behavior is distinguished from the "false start" or "hovering" forms of inhibition by the speed and apparent lack of concern with which the child places blocks or selects groups. The key aspect of non-meaningful placement is the lack of evidence suggesting that the child is processing the attributes of the blocks and placing them according to a principle based on combinations of height, mark, color, and/or shape. Systematic placement by criteria irrelevant to the task (color or shape) is not considered non-meaningful placement.

4. Spuriously Successful Block Placement: This variable applies to cases where the children repeatedly sort the blocks correctly but do not give any other indication that they are using the sorting principle of height and mark combinations. It applies only to units in which at least one of each of the four types of blocks is placed and in which all blocks are placed correctly. In such units the placements may be coded as "spurious success" if the coder feels that success did not result from application of the sorting principle but from chance or from memorization according to some idiosyncratic principle. The key element for coding this variable is lack of evidence that the child is attending to and utilizing the attributes of height and mark while placing blocks. One aspect of this behavior is failure to respond when the mother asks for a description of the blocks or for an explanation of the sorting principle. In addition, a response pattern characterized by rapid placement without looking or searching behavior that would suggest systematic processing of the blocks, is typically present.

5. General Inattention to the Task: This variable subsumes all non-task behavior of the child except activity coded as task resistance. It is coded

when the child fails to listen to the mother completely or to follow her directions promptly because he is involved in non-task interests. Included are interruptive questions about refreshments or play, attempts to play with the blocks or other things in the room, and lapses of attention due to distractions or desires to explore the room. These actions differ from those coded as resistance in that they do not involve an overt expression of displeasure with the task per se (although they may be equally disruptive or undesirable from the mother's standpoint).

The child behavior variables are coded for presence or absence in units, rather than for each separate placement. The unit begins when the mother indicates that blocks are to be placed and ends with the discussion (if any) following the final placement. The unit is coded "2" if the coder feels that a particular variable is clearly or obviously present, "1" if the evidence is less compelling, and "0" if the variable does not appear to be present. The variables are intended to be mutually exclusive, so that a particular behavior sequence should be related to only one variable (if any). However, during the course of a unit the child's behavior may vary, and often it is appropriate to code two or more behavior variables as being present in the same unit.

The child behavior variables may also be coded for presence or absence in the post-task test (except for Spuriously Successful Placement, which does not apply). Resistance, Inattention, and Inhibition are coded exactly as described above, except that the child is interacting more with the tester than with the mother. Non-meaningful Placement is more narrowly defined for the test period. It is coded "present" for children who say that the test blocks can be placed in any or all of the groups. It is coded "absent" for children who commit themselves

to a specific group, whether they are correct or not and irrespective of the reasons they may offer.

GLOBAL RATINGS

In addition to the coding of short passages of interaction by the methods previously described, global ratings based on a reading of the entire interaction were obtained on a few variables. To make these ratings, raters read both transcripts (subjects' verbalizations and observer's running descriptions) from the beginning up to the point where the mother called in the tester to test the child. The ratings concern the affective responses of the mothers (praise, criticism, warmth) toward their child and the kind and amount of pressure or control which they exert. For most ratings the raters' job is to determine the scale point which is most typical of the mother's behavior relevant to the variable in question. "Typical" here means "modal" or "usual," as opposed to "average," which implies the use of some subjective averaging technique to arrive at a mean or median score. The choice of this approach reflects our attempt to maximize the comparability of the ratings of mothers by minimizing the effects of differences in the children's cooperation upon them. It is the same approach as that developed by Champney in constructing the Fels Parent Behavior Rating Scales.[1] The following ratings are made:

1. Praise: This rating complements the coding of positive feedback and reinforcement by yielding data on the degree to which the mother goes beyond simple feedback to praise the child for his efforts or successes. Simple acknowledgement of correct responses ("Yes," "That's right.") is not considered

[1] Baldwin, A. L., Kalhorn, Joan, and Breese, Fay. The Appraisal of Parent Behavior. Psychological Monographs (1949), 63, No. 4 (Whole Number 299).

"praise" unless it is accompanied by dramatic or affectionate components which suggest a more personal response to the child. "Good," and "fine," are considered praise, as are more intensive and obvious responses such as "My, but you are a smart boy."

Rating Scale for Maternal Praise

Rate the mother's tendency to praise the child's behavior during the task situation. Does the mother lavish praise upon the child, or does she allow his successes to go unacknowledged? Rate independently of the mother's tendency to criticize the child.

1. Mother praises the child constantly, rewarding even the most inconsequential successes.

2.

3. Mother praises frequently, rewarding the child when he concludes significant subsections of the task and also praising his important actions occasionally.

4.

5. Mother praises the child's more important accomplishments but responds to his minor actions with simple feedback.

6.

7. Mother praises infrequently, offering only one or two compliments beyond the feedback level.

8.

9. Mother never praises the child beyond the feedback level throughout the task.

On this and subsequent scales, the undefined scale points (even numbers) are intended to represent midpoints between adjacent defined scale points. The scale points are worded in such a way that the ratings should reflect the mother's tendencies to praise weighted by their opportunities to do so (frequency of

success by the child), and not simply the frequency of praise.

2. Criticism: The criticism rating parallels that for praise by measuring the degree to which mothers go beyond simple negative feedback ("No," "That's wrong.") to criticize the child personally for his poor cooperation and/or performance. Included are derogations of the child's character or intelligence, expressions of disgust or other negative evaluations of the child, and actual punishment for failure. Negative feedback accompanied by gestural or expressive components which convey negative evaluation of the child is also considered "criticism." Expressions of frustration may or may not be considered "criticism," depending on whether the mother blames the child personally for her disappointment.

Rating Scale for Maternal Criticism

Rate the mother's tendency to criticize the child's actions. Does she punish the child for every error, or does she simply help the child to correct them without criticizing him? Rate independently of the mother's tendency to praise the child.

1. Mother criticizes constantly, punishing even the smallest errors.

2.

3. Mother criticizes frequently, expressing disapproval of the child for poor performance.

4.

5. Mother criticizes the child occasionally for poor performance, but reacts to most errors with simple feedback.

6.

7. Mother criticizes infrequently, expressing disapproval of the child's performance beyond the feedback level only once or twice.

8.

9. Mother never criticizes the child beyond the feedback level throughout the task.

3. Affectionateness: This rating concerns the mothers' general affective reactions to their children. The scale points are taken from the Affectionateness scale of the Fels Parent Behavior Rating Scales. Because most mothers are typically accepting of their children, raters note high and low extremes of affectionateness which appear during the interaction in addition to rating the mothers' typical behavior.

Rating Scale for Maternal Affectionateness

Rate the mother's expression of affection to the child personally. Does she manifest a warm, personal affection, or a matter-of-fact, unemotional attitude or definite antagonism?

A. Location. What is her most typical behavior?

1. Passionate, consuming, intense, ardent, uncontrolled.

2.

3. Affectionate, warm, fondling, loving, expressive.

4.

5. Temperate, fond, attached, forgiving, kind.

6.

7. Objective, inhibited, neutral, matter-of-fact.

8.

9. Cool, aloof, distant, forbidding.

10.

11. Avoiding, annoyed, irritated, bothered.

12.

13. Hostile, rejecting, disliking, blaming, icy.

B. Range. How far did her emotional behavior range during this interaction? Between _____ and _____.

4. Acceptance - Rejection: While the previous rating reflects the mothers' overt behavior, this rating is intended to categorize their underlying attitudes toward the child. It is more inferential than the previous ratings, and more than any other requires consideration of the total interaction. Maternal verbalizations not meant for the child, such as "thinking out loud," and expressive reactions not seen by the child often provide valuable clues to the mothers' attitudes which supplement those obtained from direct mother-child interaction.

Rating Scale for Maternal Acceptance-Rejection

What basic emotional attitude toward the child underlies the mother's reaction to him? Rate independently of the mother's overt affectionateness.

1. Total acceptance. The mother accepts her child as a desirable, worthwhile person regardless of his behavior.

2. Near-total acceptance. Only resistance toward the mother can endanger the child's acceptance.

3. The mother basically accepts her child as a person, although she rejects him when he acts against her wishes. Withdrawal of acceptance is used as a control technique.

4. The mother appears to accept the child, but she invests little affect in her relationship with him.

5. No basic attitude is shown. The mother is impersonal, unemotional, detached in her relationship with the child.

6. The mother apparently doesn't accept the child, but she doesn't convey rejection overtly.

7. The mother shows by her actions that she doesn't see the child as very worthwhile. While she is not hostile she doesn't express much interest in the child and doesn't seem to enjoy his company.

8. The mother tends to belittle the child and his behavior, seeing him as an unpleasant burden to her. Although she may react positively toward him at times, she never shows unqualified acceptance of him as a person.

9. Total rejection. The child is excluded from maternal love, treated with sarcasm, cynicism, hostility.

5. Child Cooperation: This rating grossly characterizes the child's cooperation during the task as a whole, and provides a useful index of the degree to which the mother has to motivate or control in addition to teaching the material. The rating is based solely on the child's attention and cooperation; successes or failures in task-specific responses are not considered.

Rating Scale for the Child's Cooperation

What was the character of the cooperation shown by the child during the task? Was he interested and attentive, or bored and restless, or resistant? Rate independently of the actions of the mother, considering only the child's behavior.

1. Child was fully tuned in to the mother - pliable, interested, attentive. No difficulty or conflict arose.

2.

3. Child maintained fairly consistent attention and cooperation, although some disinterest or restlessness was evident.

4.

5. Child was periodically inattentive, but inattention was not prolonged, and there was no resistance to the mother or the task.

6.

7. Child showed frequent and prolonged disinterest and inattention, and/or resistance to the mother or the task.

8.

9. Child ignored the mother's teaching efforts and/or actively resisted the task throughout the interaction.

The previous five rating scales are used for both the block sorting task and the "Etch-A-Sketch" task protocols. Two independent sets of ratings are obtained and all differences are resolved to arrive at final scores. When the difference is a single point, the even-numbered score is assigned by convention. When the difference is two points the score in between the two ratings is assigned. Differences of three or more points are resolved by re-rating and discussion.

The following three scales are used only with the block sorting task. They measure the pressure or control exerted by the mothers in handling three common difficulties presented by the children.

6. Demand for Attention: This rating categorizes the mother's response to inattentiveness in the child. The categories reflect the success or failure of the mother to obtain attention, rather than the methods she uses in attempting to do so.

Rating Scale for Demand for Attention

What quality of attention does the mother demand?

1. Mother is constantly alert to the child's behavior and her attitude is one of "all business." She demands complete attention.

2. Mother is not constantly alert to the child's behavior, but she does intervene to focus his attention on the task (or her talking) when she becomes aware of lack of attention.

3. Mother may be constantly aware of the child's state, but she accepts his restlessness, looking around, etc. However, she will intervene if the child begins to tune out more obviously.

4. Mother is aware of the child's attention or lack of it, but is unable to do anything about it, although she tries.

5. Mother is aware of the child's attention or lack of it, but she does nothing to focus his attention. She is either undisturbed by the child's disinterest or is confused and unable to deal with it except by repetition of her lecture.

6. Mother abandons the task rather than demand attention.

7. Response Quality Demanded: This rating categorizes the mother's response to a child who makes responses which appear to be random guesses or which appear to be emitted without evidence of forethought or ego-involvement. The categories reflect differences in the degree to which mothers are vigilant in recognizing this behavior and attempting to correct it. Cases in which the problem never arises are rated as "not applicable," since the mothers' responses cannot be determined.

Rating Scale for Quality of Response Demanded

What does the mother demand of the child when he is attempting to place blocks or to verbalize labels? Does he have to be fully ego-involved in each response, or can he simply "emit" responses?

0. Not applicable. Child always spontaneously inspected blocks before acting and never needed to be told to think about what he was doing.

1. Mother consistently demanded that the child look at the blocks carefully before responding, so that each response would be a deliberate, purposive act.

2. Mother did not consistently demand that the child inspect blocks before responding, so that at times the child might have been working from memory or hunch (rather than making deliberate choices based on perception of the relevant properties of the blocks).

3. Mother allowed obvious guesswork from the child, who simply "emitted" responses.

4. Mother allowed responses which showed that the child was not meaningfully involved in the task (placing blocks in the nearest group, persisting in an irrelevant verbal response, parroting the mother's last words, tec.).

8. Response to Tuning Out: This rating categorizes the reactions of mothers when the children force an interruption of task-oriented teaching by becoming absorbed in non-task interests. This behavior is called "tuning out," and is to be distinguished from both inattention (a more general term which includes scanning of the surroundings and other forms of inattention to the mother which do not

involve complete absorption in a specific, localized non-task interest) and resistance (negative response to the task itself rather than positive interest in something else). The categories reflect different degrees of maternal tolerance of tuning-out by the children.

Rating Scale for Maternal Response to Tuning Out

How does the mother react if the child asks a non-task question (about going home, playing, food, etc.)? Tuning out differs from simple inattention in that the child becomes absorbed and fully ego-involved in the non-task interest. It differs from resistance in that the child is not openly defying the mother.

0. Not applicable. Child never tunes out.

1. Mother adopts a "Never mind that, you're supposed to pay attention" attitude. She does not discuss or deal with the child's new interest at all and tries to focus him back on the task immediately.

2. Mother gives a minimal response and then continues the task. She doesn't seem irritated with the child, but she is obviously unwilling to interrupt the task. She satisfies the child only enough to avoid direct conflict.

3. Mother makes some attempt to satisfy the child's curiosity and/or wait until his new interest dissipates, but she is eager to return to the task at the opportune moment. She seems to want to gratify the child but also to fear the consequences of interruption.

4. Mother seemingly does not mind the intrusion and is not threatened by it. She is not overly eager to return to the task immediately, and she allows the child to dwell on the intrusion until he loses interest in it.

5. Mother ignores or seems oblivious to the child's tuning out and continues with the task as though the interference never occurred.

6. Mother succumbs to the non-task interest, losing control of the child.

9. Maternal Support in the Test Period: This rating categorizes the mothers' reactions to their children during the post-task test period. Although the mothers are not allowed to give information or prompts, they can and do attempt to support the children through exhortation or expressions of confidence.

In addition, they often influence the children unwittingly by making obvious expressive or gestural reactions.

Rating Scale for Maternal Support in the Test Period

1. Rejection. Mother blames the child for failure or makes derogatory remarks about him to the tester.

2. Dissatisfaction. Mother scowls, frowns, exhorts impatiently, or otherwise indicates dissatisfaction with the child's performance, but she does not overtly blame or accuse him.

3. Neutral. Mother withdraws from involvement during testing. She watches the interaction between child and tester but keeps her reactions to herself.

4. Implicit Support. Mother communicates sympathy, confidence, and/or support through minimal expressive cues or cheerful encouragement.

5. Explicit Support. Mother makes a point of praising the child's success or of defending him and reaffirming positive regard after failure.

For these four ratings, and for all the coding previously described, scores are assigned after resolving all disagreements by returning to the data. Thus each separate code or rating either was agreed upon in the original codings or is the score agreed upon after discussion (except for those ratings on five scales which were determined by convention).

MEASURES DERIVED FROM THE SUPPLEMENTARY CODING

A second set of measures on the mothers and children was derived from the coding analysis and rating scales just described.

MATERNAL MEASURES

1. Orientation to the Future: present or absent.
2. Orientation to the Grouping Concept: present or absent.
3. Orientation to the Sorting Principle Concept: present or absent.
4. Orientation to the "Mark" Concept: score on 4-point scale (0-3).

5. Orientation to the "Height" Concept: score on 4-point scale (0-3).

6. Length of Orientation Period: 0 = less than 30 seconds, 1 = 31-90 seconds, 2 = 91-150 seconds, 3 = more than 150 seconds.

7. Percent Both Labels (Pre-Response): percentage of blocks placed which were preceded by a maternal instruction which gave both relevant labels.

8. Percent Any Label (Pre-Response): percentage of blocks placed which were preceded by a maternal instruction which gave either (or both) of the relevant labels.

9. Percent Pre-Response Focusing: percentage of blocks placed which were preceded by maternal attempts to focus the child's attention on the relevant attributes (either or both); i.e., the percentage of placement responses on which the mother was coded for "focusing" during her pre-response instructions.

10. Percent of Global Instructions Containing Labels: percentage of placement units which were preceded by global instructions which contained specific labels.

11. Percent Labels after Error: percentage of errors followed by feedback containing verbalization of the appropriate label(s). For this and the following measure, failures to match either by height or by mark are counted as errors. Thus for a particular block placement there may be no errors, one error (correct on one attribute, wrong on the other), or two errors (wrong on both attributes). In coding both errors and verbalization of labels after errors, only presence or absence was noted. "Presence" was coded if the error or the label occurred at any time between the first commitment to a group and the final discussion following that or any succeeding placements of the block (all of which are considered part of the same placement response). Thus redundancy due to repetition of the same error and/or feedback message which occurs during a single placement response is not taken into account. For each block, then, presence or absence of

mark errors, height errors, verbalization of mark labels, and verbalization of height labels is recorded. The measure used is the percentage of errors which were followed by feedback containing verbalization of a label describing the attribute on which the error was made. If a more molecular level of analysis is desired, both errors and feedback could be tabulated for each successive movement of a block following the original commitment. This was not done in our analysis because it appeared that most mothers treated these events as progressive sub-parts of a larger whole, and their feedback messages often referred back to events earlier in the sequence; so it was felt that a more molecular definition of response and feedback was likely to reduce validity.

12. Percent Focusing after Error: percentage of errors on which the mothers' feedback was coded for focusing on the appropriate attribute in addition to verbalizing a label. This measure parallels the previous one, and the discussion above also applies here.

13. Percent Labels after Success: percentage of blocks placed correctly (by both attributes) which were followed by verbalization of one or more labels.

14. Percent Focusing after Success: percentage of blocks placed correctly (by both attributes) which were followed by attempts to focus attention on either or both attributes.

15. Praise: rating on 9-point scale.

16. Criticism: rating on 9-point scale.

17. Modal Affectionateness: rating on 13-point scale.

18. High Point Affectionateness: rating on 13-point scale

19. Low Point Affectionateness: rating on 13-point scale. "High" and "low" refer to the mother's affectionateness rather than to the number of the cue points on the scales, so that the high point corresponds to the lowest-numbered

end of the range for each mother.

20. Acceptance-Rejection: rating on 9-point scale.

21. Demand for Attention: rating on 6-point scale.

22. Response Quality Demand: rating on 4-point scale.

23. Response to Tuning Out: rating on 4-point scale.

24. Test Period Support of Child: rating on 5-point scale.

CHILD MEASURES

1. Resistance: percentage of units coded for resistance by the child (36% of our cases had one or more units coded for resistance).

2. Inhibition: presence or absence in one or more units (percentage scores were not used because only 15% of the children were coded for inhibition at any time).

3. Non-Meaningful Placement: average score obtained by summing the codes for each unit (0, 1, or 2) and dividing by the number of units (present in 42% of the cases).

4. Spuriously Successful Placement: presence or absence (present in 21% of the cases).

5. Inattention: average score obtained by summing the codes for each unit (0, 1, or 2) and dividing by the total number of units (present in 72% of the cases).

6. Resistance in the Test Period: presence or absence (present in 4% of the cases).

7. Inhibition in the Test Period: presence or absence (present in 10% of the cases).

8. Non-Meaningful Placement in the Test Period: presence or absence (present in 21% of the cases).

9. Inattention in the Test Period: presence or absence (present in 18% of the cases).

Other child measures may be obtained by combining some of the above scores to form groups of high vs. low in undesirable behavior variables, presence vs. absence of test period behaviors, etc.

FACTOR ANALYSES OF THE MEASURES

The measures described in this manual allow an exhaustive, detailed analysis of the block sorting task interactions. However, for many purposes this proliferation of scores is less useful than a smaller number of more basic and inclusive variables. Consequently the data from the Cognitive Environment Study were subjected to factor analyses (principal component, separate analyses for mother measures and child measures). Although results varied somewhat as new rotations were performed, six mother factors and four child factors which made good theoretical as well as statistical sense, appeared regularly. These factors subsume twenty-eight mother measures and eighteen child measures, so that considerable data reduction is achieved.

Although the composition of factors was determined by examination of rotated factors, the factor scores used in the Cognitive Environment Study are based on unrotated factors. In this way the data are reduced to basic measures reflecting the major variables involved, but orthogonality is not forced as it is in rotated factors. Factor composition was determined from the factor loadings, with .40 being designated as the minimal loading allowed for inclusion of a variable on a factor. By this method, twenty-eight maternal variables were grouped on six factors, and eighteen child variables were grouped on four factors, with each

variable appearing on only one factor. Factor scores were obtained by entering into a new analysis only the variables to be included on the factor (rather than the entire set of mother or child variables) and then obtaining the first unrotated factor. The subjects' factor scores from these unrotated first factors were then used as basic measures, along with other measures that did not appear on any factor. Presented below is a list of the variables on factors with their raw correlations, their correlations with the factors, and their loadings on the original rotated factors from which factor composition was determined.

Factor 1. Reward-Oriented Motivation Techniques

This factor includes seven maternal measures which involve either attempts to engage the child's interest in the task through stressing its potential as a satisfying, enjoyable experience, or positive, rewarding responses to the child's performance:

Variable	1	2	3	4	5	6	7	r with factor	loading on rotated factor
1. Praise Rating (Block-Sorting Task)	--	.48	.33	.36	.22	.19	.44	.72	.69
2. Praise Rating (Etch-A-Sketch)		--	.26	.24	.29	.21	.36	.66	.58
3. Percent Engaging			--	.14	.20	.15	.68	.67	.69
4. Rate of Positive Reinforcement				--	.15	.21	.18	.47	.52
5. Orientation to the Future					--	.18	.31	.49	.40
6. Support in the Test Period						--	.32	.47	.42
7. Direction of Motivation							--	.79	.74

All coefficients on the preceding table, as well as on those below, are adjusted so that the signs reflect the actual direction of the relationship between variables, uninfluenced by the numerical codes assigned to different scale points or behaviors. Negative r's have been eliminated except where the relationship is actually negative.

Factor 2. Punishment-Oriented Motivation Techniques

This factor subsumes two measures of maternal attempts to motivate through punishment, or demands which imply punishment as a penalty for non-compliance:

Variable	1	2	r with factor	loading on rotated factor
Criticism (Block Sorting Task)	--	.38	.83	.50
Controlling Percent		--	.83	.75

Factor 3. Orientation

This factor includes measures of orientation before the first placement and the index of specificity in global instructions (which is a form of orientation preceding each new unit or series of placements):

Variable	1	2	3	4	5	6	r with factor	loading on rotated factor
1. Orientation to the "Group" Idea	--	.49	.23	.36	.45	.23	.68	.72
2. Orientation to the Sorting Principle		--	.31	.33	.48	.15	.70	.70
3. Orientation to the "Mark" Concept			--	.42	.44	.10	.61	.41
4. Orientation to the "Height" Concept				--	.61	.23	.75	.63
5. Length of Orientation Period					--	.30	.83	.73
6. Index of Labeling in Global Instructions						--	.42	.49

Factor 4. Specificity in Pre-Response Instructions

This factor subsumes the three pre-response instruction measures from the block sorting task and three measures from the "Etch-A-Sketch" task. The factor is considered to be theoretically as well as statistically valid, since the "Etch-A-Sketch" measures closely resemble the pre-response measures on the block sorting task in the types of maternal behavior they represent.

Variable	1	2	3	4	5	6	r with factor	loading on rotated factor
1. Etch-A-Sketch Practice Rating	--	.20	.49	.17	.16	.07	.46	.47
2. Etch-A-Sketch Use of Models		--	.30	.20	.22	.20	.49	.42
3. Etch-A-Sketch Specificity of Directions			--	.19	.19	.17	.54	.53
4. Percent Both Labels, Pre-Response				--	.89	.22	.80	.63
5. Percent Any Label, Pre-Response					--	.48	.87	.72
6. Percent Focusing, Pre-Response						--	.55	.58

Factor 5. Specificity in Post-Response Feedback

This factor includes the four measures of post-response feedback:

Variable	1	2	3	4	r with factor	loading on rotated factor
1. Percent Labels after Error	--	.51	.38	.31	.74	.49
2. Percent Focusing after Error		--	.17	.36	.67	.79
3. Percent Labels after Success			--	.60	.74	.46
4. Percent Focusing after Success				--	.78	.67

Factor 6. General Saturation of Task-Specific Information

This factor includes three measures of the mothers' degrees (percent used when applicable) of saturation of task-specific labels (references to height and mark). The measures span the task as a whole rather than a selected sub-part (such as feedback).

Variable	1	2	3	r with factor	loading on rotated factor
1. Percent Informing	--	-.20	.42	.62	.65
2. Global/Specific Ratio		--	-.62	-.80	-.66
3. Specificity Index			--	.89	.69

The previous six factors all involve measures of maternal teaching. The following four factors are comprised of measures of the children's behavior during the interaction.

Factor 7. Resistance

This factor includes measures of inattention and resistance to the task. Resistance is considered the key to the factor because of the variables included on the factor and because the rating of inattention due to interest in non-task matters (which does not imply resistance) did not appear on the factor.

Variable	1	2	3	4	5	r with factor	loading on rotated factor
1. Cooperation Rating, Block Sorting Task	--	.44	-.56	.57	-.57	-.82	-.73
2. Cooperation Rating, Etch-A-Sketch		--	-.24	.26	-.38	-.55	-.47
3. Percent Negative Task Involvement			--	-.69	.51	.80	.75
4. Attention Score				--	-.57	-.82	-.80
5. Resistance Score					--	.80	.85

Factor 8. Block Placement Errors

This factor represents low vs. high frequency of errors in block placement, with the "high" subjects usually being coded for Non-Meaningful Placement.

Variable	1	2	3	4	r with factor	loading on rotated factor
1. Percent Incorrect Placements	--	.52	.37	-.39	.73	.65
2. Error Rate		--	.44	-.44	.75	.58
3. Non-Meaningful Placement Score			--	-.58	.76	.73
4. Success Rate				--	.78	-.76

Factor 9. Child's Verbalization of Labels

This factor includes two direct measures of the child's success in giving the correct labels for the blocks on request, and two other measures which are associated with failure to verbalize labels:

Variable	1	2	3	4	r with factor	loading on rotated factor
1. Percent Correct Verbal Responses	--	.32	-.21	-.26	.72	.54
2. Percent Part-Correct Verbal Responses		--	-.24	-.26	.73	.57
3. Percent Questions by Child			--	.06	-.52	-.59
4. Spuriously Successful Placement (Presence)				--	-.59	-.64

Factor 10. Child's Verbal Participation

This factor subsumes variables which relate to the degree to which the child was verbally active. Only the verbal vs. non-verbal distinction is implied; children high on the factor are not necessarily high in knowledge or use of task-specific information.

Variable	1	2	3	4	5	r with factor	loading on rotated factor
1. Percent Units Child is Passive	--	.21	-.12	-.34	-.33	-.57	-.55
2. Percent Correct Placements		--	-.28	-.28	-.38	-.63	-.57
3. Percent Volunteers Task Information			--	.22	.41	.58	.58
4. Child's Total Words				--	.50	.72	.70
5. Child's Words per Minute					--	.81	.74

It should be re-emphasized that the signs of the coefficients on the above-listed factors are adjusted to reflect the true direction of the relationships among the variables as labeled (not necessarily the direction obtained from correlating the numerical ratings and scores). Examination of the data with this in mind reveals that none of the intercorrelations among variables is particularly unusual or surprising insofar as the direction of relationship is concerned; all conform to what would have been predicted on the basis of prior knowledge of the variables involved.

Since unrotated rather than rotated factors were used, correlation between factors within the two sets (mother and child measures) can and does exist. Intercorrelations among all 10 factors are presented below:

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Factor	Subject	Description	1	2	3	4	5	6	7	8	9	10
1.	Mother	Reward-Oriented Motivation	--	-.20	.25	.33	.23	.04	-.05	-.18	.12	.10
2.	Mother	Punishment-Oriented Motivation		--	-.09	-.06	-.18	-.10	.40	.30	-.21	-.04
3.	Mother	Orientation			--	.26	.31	.19	-.10	-.23	.31	.10
4.	Mother	Pre-Response Instructions				--	.27	.32	-.06	-.14	.30	.09
5.	Mother	Post-Response Feedback					--	.28	-.20	-.28	.41	.09
6.	Mother	General Task Information						--	00	-.30	.19	.11
7.	Child	Resistance							--	.21	-.27	.08
8.	Child	Block Placement Errors								--	-.22	-.09
9.	Child	Verbalization of Labels									--	.14
10.	Child	Verbal Participation										--
Warmth Factor*			.60	-.45	.21	.17	.15	.03	-.15	-.15	.13	.15
"Tug-of-War" Factor*			-.26	.51	-.17	-.19	-.24	-.01	.80	.25	-.36	.02
"Task-Specific Verbal Interaction" Factor*			.22	-.12	.21	.08	.31	.12	-.07	-.42	.37	.69

Most of the intercorrelations between factors within sets (mother or child) are in the .20 - .30 range, with none above .33. This seems quite satisfactory, if not optimal, for our purposes, since the effects of gross differences among mothers are not lost through forced orthogonality, but at the same time the specific character of each factor is maintained.

*To be discussed in text below.

Listed below the ten factors described earlier are three additional factors from other analyses. They are included on the table above to facilitate interpretation of their content. The "warmth" factor is the first unrotated factor subsuming eight ratings of maternal behavior (the three affectionateness ratings and the acceptance-rejection rating, from the block sorting task and the "Etch-A-Sketch" task). Although based on different measures, this factor overlaps considerably with the two maternal factors relating to motivation techniques. The "warmth" factor is considered to be more general than the latter two factors, which for the most part are restricted to verbal behavior and to task-specific interaction sequences.

The "tug-of-war" and "task-specific interaction" factors are from an earlier analysis which included only the variables from Dr. Jackson's message unit analysis. These factors were obtained from a matrix containing both mother and child measures and were extracted through an image-covariance method rather than a principal component analysis. The "tug-of-war" factor represents high vs. low resistance by the child and maternal attempts to control through negative sanctions. Interactions high on the factor were marked with conflict between mother and child. The "task-specific verbal interaction" factor is more general. It overlaps considerably with the child's verbal participation factor (factor 10 above), but it also includes task-specific child performance measures and maternal teaching measures. Interactions high on this factor are characterized by relatively good maternal teaching, high verbal participation by the child, and relatively successful learning by the child.

NOTE: For a description of the recording technique, see MANUAL OF RECORDING AND OBSERVATION TECHNIQUES FOR MOTHER-CHILD INTERACTION.